Hot-plugging

First Hit   Fwd Refs

FD   5/8/98

☐ ▓ Generate Collection ▓   Print

L11: Entry 4 of 5   File: USPT   Aug 28, 2001

DOCUMENT-IDENTIFIER: US 6282646 B1
TITLE: System for real-time adaptation to changes in display configuration

Abstract Text (1):
A hot-plugging capability for video devices is achieved by shifting the
responsibility for recognizing changes in the configuration of a display
environment from a computer's operating system to a device manager. When an
input/output device is added to or removed from the computer system, an interrupt
signal informs a device manager of the fact that a change in configuration has
occurred. In response thereto, the device manager determines whether the changed
component relates to the computer's display function. If so, the device manager
makes a call to the computer's display manager, to inform it of the fact that the
display configuration has changed. In response to this call, the display manager
reconfigures the display space for the computer system and notifies clients as
appropriate, to accommodate display features associated with the added component.
With this change in the configuration of the display space, the added component
becomes immediately available for use.

Brief Summary Text (8):
As the capabilities offered by personal computers continue to expand, the
opportunities for changing the configuration of computers grows in a concomitant
manner. In some situations, users may desire to have changes in the configuration
of the computer's display environment become instantaneously effective, without the
need to restart the computer or even place it in a sleep mode. For example, the
user may create a slide presentation on a notebook computer. During the course of a
meeting, a user may desire to immediately display the slide presentation, by
connecting the computer to a suitable video projector, or the like. It is desirable
to be able to carry out this operation without the need to first put the computer
to sleep, and thereby reduce the time needed to operate within the changed
configuration. It is an objective of the present invention, therefore, to expand
upon the capabilities of the system of the '529 patent, by providing a display
environment in which so-called "hot plugging" of displays is possible, wherein a
display becomes immediately available for use as soon as it is plugged into the
computer system.

Detailed Description Text (28):
From the foregoing, it can be seen that the present invention provides a hot-
plugging capability for video devices, that enables users to immediately take
advantage of changes in the display configuration of a computer system, such as the
addition of a new video card. This functionality is attained by providing
notification of the changed configuration directly to the display manager, rather
than waiting for an action that prompts the operating system to review the current
configuration, such as rebooting the computer.

CLAIMS:

10. A system which provides hot-plugging capabilities for display devices,
comprising:

a video device including a frame buffer for storing data that defines an image to

be displayed on an associated display device;

a display manager which defines a display space and assigns a portion of said display space to said frame buffer, and which provides data for images to be displayed to said frame buffer; and

a device manager which detects the addition or removal of a device in a computer system, determines whether a device which has been added or removed is a video device, and provides a notification of such addition or removal to the display manager when a video device is determined to have been added or removed, to cause the assignment of a portion of the display space to be modified in accordance with a detected addition or removal.

13. A system which provides hot-plugging capabilities for display devices, comprising:

at least one display for displaying images;

a display manager which defines a display space and assigns a portion of said display space to a display device, and which provides data for images to be displayed on said display device; and

a device manager which detects the addition or removal of a device in a computer system, determines whether a device which has been added or removed is a display device, and provides a notification of such addition or removal to the display manager when a display device is determined to have been added or removed, to cause the assignment of a portion of the display space to be modified in accordance with a detected addition or removal.

25. A system which provides hot-plugging capabilities for display devices, comprising:

a video device including a frame buffer for storing data that defines an image to be displayed on an associated display device;

a display manager which defines a display space and assigns a portion of said display space to said frame buffer, and which provides data for images to be displayed to said frame buffer;

a device manager which detects the addition or removal of the video device to a computer system, and provides a notification of such addition or removal to the display manager to cause the assignment of a portion of the display space to be modified in accordance with a detected addition or removal; and

means responsive to the removal of a video device for storing a preference file in memory which indicates the status of objects being displayed.

displayed, at step 608, as part of the indicia displayed at step 602. As shown in FIGS. 15 and 16, these indicia 710 may in one embodiment be comprised of representations 712 of the user's <u>fingers</u> depicting the <u>positions of the fingers</u> relative to the keys of the input device. Preferably, the finger representations 712 are lenticular or semi-transparent and overlay the key representations 704 and other information 706 displayed on the display 708 such that the key representations 704 and information 706 remain viewable. Wherein the <u>position</u> of any of the user's <u>fingers</u> relative to the keys of the input device changes, as, for example, while typing on the keyboard, the digital information appliance may then sense the new <u>finger position</u> (at step 610 of FIG. 14) and alter the displayed indicia (e.g., redisplay the <u>finger</u> representations at step 608), accordingly.

<u>Detail Description Paragraph</u>:
[0070] As shown in FIG. 14, the method 600 may be viewed as providing three distinct but interrelated functions: displaying indicia representing the <u>position</u> of keys of the input device 618, sensing and displaying <u>finger position</u> 620, and sensing and indicating key actuation 622. It should be appreciated that, based upon design and/or user preferences, a digital information appliance may be configured to provide none, any or all of the functions 618, 620 & 622 without departing from the scope and spirit of the present invention. For instance, in one exemplary embodiment, a digital information appliance may display indicia for indicating key position to the user (perform function 618). The digital information appliance may further sense and indicate key actuation (perform function 622). Such a digital information appliance may, however, utilize an input device comprised of a keyboard that does not sense <u>finger position</u>. Similarly, in another embodiment, a digital information appliance may be capable of providing all three functions 618, 620 & 622. However, a user may choose to view only key <u>position</u> (provided by function 618) and not <u>finger position</u> provided by function 620) and/or key actuation (provided by function 622).

CLAIMS:

5. The digital information appliance as claimed in claim 4, wherein the keyboard comprises a QWERTY key configuration and wherein keys normally typed by the right hand are positioned in the right key range and keys normally typed by the left hand are positioned in the left key range so as to be generally in the natural QWERTY <u>position</u> relative the user's <u>fingers</u> while holding said housing.

29. The method as claimed in claim 22, further comprising verifying the <u>position of the finger</u> with respect to the key via a representation of the input device and <u>finger position</u> displayed on the display.

35. The method as claimed in claim 32, further comprising: sensing a <u>position</u> of a user's <u>finger</u> relative to the key; and displaying a second indicia indicating the <u>position of the finger</u>.

40. The program of instructions as claimed in claim 37, further causing the digital information appliance to execute the step of: sensing a <u>position</u> of a user's <u>finger</u> relative to the key; and displaying a second indicia indicating the <u>position of the finger</u>.

45. The digital information appliance as claimed in claim 44, wherein said keyboard comprises a QWERTY key configuration and wherein keys normally typed by the right hand are positioned in the right key range and keys normally typed by the left hand are positioned in the left key range so as to be generally in the natural QWERTY <u>position</u> relative the user's <u>fingers</u> while holding said housing.

49. The digital information appliance as claimed in claim 42, wherein the program of instructions further configures the digital information appliance to sense a <u>position</u> of a user's <u>finger</u> relative to the key and display second indicia

manner, the fingers of the user's left and right hands 122 & 124 may be properly positioned over the touch sensitive panel 140 so as to be in the proper position for supporting conventional touch typing techniques. Further, since the keyboard is emulated, various key configurations may be defined as desired by the user or as required by the applications executed by digital information appliance. For instance, the left and right key ranges 142 & 144 may be defined to emulate the divided QWERTY keyboard 132 illustrated in FIGS. 2 through 4. Alternately, the key ranges 142 & 144 may be defined to provide alternate key configurations such as a Dvorak key configuration, a non-English language key configuration, a numeric keypad configuration, a telephone keypad configuration, or a user or application specified key configuration (see FIGS. 15 and 16). Exemplary apparatus and methods for providing configurable keyboards utilizing touch sensitive panels are described in commonly owned U.S. pat. application Ser. No. 09/346,777 which is herein incorporated by reference in its entirety.

Detail Description Paragraph:
[0055] In exemplary embodiments of the invention, support 404 may include a pivot 422 or like device for adjusting the orientation of the appliance portion 402 with respect to the user. In this manner, the position of the appliance portion 402 may be changed (e.g., tilted or rotated) to provide a more comfortable holding position for the user. Further, the support 404 may include provisions for mounting peripheral devices 426 usable with the digital information appliance 400. For example, in an exemplary embodiment, the support 404 may include one or more bays 424 suitable for holding common accessory devices 426 such as hard disk drives, floptical disk drives, optical (CD-ROM, DVD etc.) disc drives, printers, optical indicia readers, and the like. These peripheral devices 426 may be operably coupled with the appliance portion 402 via wiring or cabling contained within the support 404 (not shown).

Detail Description Paragraph:
[0065] The method 600 is initiated, at step 602, wherein indicia are displayed on the display of the digital information appliance for indicating the positions of keys of the input device (e.g., a keyboard or touch sensitive panel) located on the back surface of the appliance's housing (see FIGS. 1 through 11). As shown in FIGS. 15 and 16, the digital information appliance 700 may display indicia 702 comprised of representations 704 of the keys of the input device. In an exemplary embodiment, these key representations 704 are lenticular or semi-transparent so they may be superimposed over other information 706 displayed on the appliance's display 708 while allowing the information 706 to remain viewable. Preferably, the key representations 704 are positioned within the display 708 so their location corresponds to the location on the back surface of the housing of the keys they represent. Thus, the user would see the keys of the input device as if looking though the housing of the digital information appliance 700 via an "X-ray" view. The user, viewing the indicia 702, may kinesthetically actuate or depress keys of the input device (i.e., actuate keys in response to the displayed indicia 702). Such kinesthetic key actuation may be accomplished by first locating the desired key representation 704 of the indicia 702 displayed on the display 708, positioning a finger of the hand over the expected position of the key in the input device as determined from the key representation 704, and actuating, e.g., depressing, the key.

Detail Description Paragraph:
[0067] Referring again to FIG. 14, in an exemplary embodiment, the digital information appliance may further sense the position of the fingers of the user's hand relative to the keys of the input device, at step 606. For example, wherein the input device is comprised of a touch sensitive panel utilizing resistive or capacitive touch pad technology, as discussed in the descriptions of FIGS. 3 and 9, the touch sensitive panel may detect the position of the user's fingers while resting on or being held in close proximity to its surface. Indicia showing the position of the user's fingers relative to the keys of the input device may then be